

Figure A.2.3-1. Launch Platform

A.2.4 Transit Operations

The integrated launch vehicle, including the encapsulated payload, will be supported on the transporter/erector in the LP hangar during transit to the launch location. Accommodations for six customer technicians will be provided onboard the LP during transit.

While the ACS and LP are in route to the launch location, a mission rehearsal will be conducted. The rehearsal involves the launch personnel and customer personnel onboard the ACS, the tracking assets (Selena-M tracking ship, Altair satellite [sometimes called Luch satellite], ground stations, etc.), and the customer's spacecraft control center. The rehearsal will simulate the prelaunch operations and post launch operations up through spacecraft separation and completion of the Block DM-SL's contamination and collision avoidance maneuver (CCAM). The launch vehicle operations on the LP will be simulated while the launch vehicle remains in the hangar. Successful completion of the launch rehearsal is a prerequisite to launch. These operations are simulated to a major extent and systems that could pose a threat to the environment are not exercised.

Transit of the two vessels between the Home Port and the launch area will be a normal maritime operation and is controlled by existing regulations as noted in Section 3 and in Appendix B.

A.2.5 Platform Launch Operations

At the launch location, the LP will be lowered from the transit draft to the launch draft, and the ACS and LP will moor alongside each other. The launch draft provides a more stable platform. The launch may be accomplished in mean significant wave heights up to 2.5 m. This launch position will be accomplished at least 17 hrs before scheduled launch time (T). A connecting bridge will be extended between the two vessels to allow prelaunch processing personnel access to the LP. Final spacecraft

“hands-on” operations (i.e., ordnance arming) will be accomplished and payload fairing hatches will be closed out. (Ordnance is used for stage separation and launch; please see Appendix B-20 for further information.) Launch management personnel and the customer will be polled and approval will be given to roll out the integrated launch vehicle (ILV) from the hangar to the launch pad.

The hangar hatches will be opened and the automatic sequence that moves the Zenit-3SL to the launch pad will be initiated. As the launch vehicle moves to the pad, the electrical, pneumatic, hydraulic, and propellant lines will be automatically connected. At the launch pad the launch vehicle will be rotated to a vertical position. Prior to rotation, the portable conditioned air supply will be switched to the launch pad conditioned air supply system.

At this time, the majority of the LP and launch support personnel will leave the LP and the ACS maneuvers to a position approximately five km from the LP. The repositioning of the ACS will occur at approximately T-15 hrs.

The transfer and verification of launch systems control and LP systems control will be started. Initial purging and conditioning of launch vehicle fueling systems will be started and final preparations accomplished. When the transfer of control and the prelaunch checkouts are completed and the results have been verified, the remaining LP and launch support personnel will be transferred by motor launch to the ACS prior to rocket fueling. The LP will now be uninhabited and all critical systems will be controlled remotely from the ACS. The transfer of the remaining personnel to the ACS will occur between approximately T-5 hrs and T-3 hrs.

The fueling of the Zenit (LOX and kerosene) and LOX loading of the Block DM-SL will be started at approximately T-2.5 hrs and completed at T-24 min. The erector will be lowered to the horizontal position and moved into the hangar and the hatch doors will be closed. Fuel lines will be drained and purged with GN₂ prior to disconnecting.

Final launch sequence will be accomplished. In order to minimize exhaust effects on the LP and acoustic effects on the spacecraft, a freshwater deluge system will be used in the flame deflector. The water deluge to the flame trench/deflector will begin at T-5 sec. Stage 1 ignition will occur at T-3 sec. The main command to ramp up the main engines to launch thrust will be issued at T=0 after engine parameters have been verified by the onboard control system.

The Zenit-3SL will be held in place on the launch table by hold-down clamps at the base of the first stage. These clamps will be released after the computers confirm that the Stage 1 engine is operating properly and engine ramp up exceed 50% thrust.

If the engine parameter verification or the hold-down clamps release is not successful, the engine will be shut down by the onboard control system prior to lift off.

A.3 ABORT OPERATIONS

Launch abort operations are described in Section 5.2 as part of the environmental analysis, and they are further addressed as a part of mission definition in the license application submitted to AST (SLLP). In general, a launch abort is a controlled event in which the rocket would be stabilized and fuels extracted and stored for reuse. The launch vehicle would then be lowered to a horizontal position and moved into the hanger on the LP. The situation would then be assessed before a decision can be made to restart the launch sequence or return to the Home Port.

A.4 HOME PORT FACILITIES AND SERVICES

The Sea Launch Home Port complex will provide the facilities, equipment, supplies, personnel, and procedures necessary to receive, transport, process, test, and integrate the spacecraft and its associated support equipment with the launch system. It also will serve as the home base for launch operations with facilities to support and service the Sea Launch vessels, including office and storage facilities. There will be no provision to support major ship repair. This work will be accomplished at a commercial facility.

The proposed Home Port is located in southern California in the Port of Long Beach. This site is part of the former Long Beach Naval Station located on the southern side of Terminal Island within the Long Beach harbor district. The proposed Home Port is located at the east end of the “Navy Mole” (Figure A.4-1), which is a large breakwater forming the western and southern boundaries of Long Beach Harbor. Access to the site is via I-110 or I-710 off the San Diego freeway (I-405). Long Beach airport (21 km), Los Angeles airport (40 km), and Orange County airport (38 km) are all within close proximity.

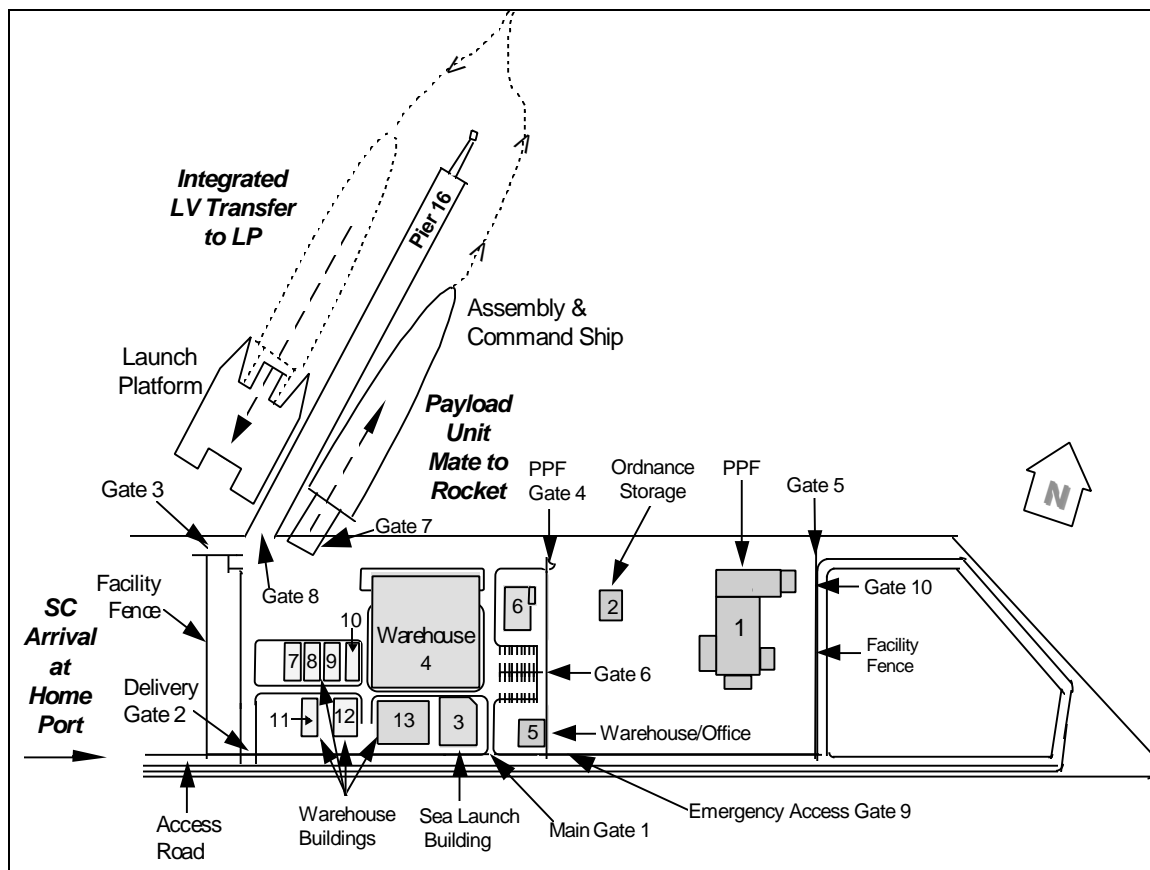


Figure A.4-1. Sea Launch Home Port Complex

The Home Port complex will consist of a payload processing facility (PPF), Sea Launch and customer office facilities, several warehouse buildings, and a pier. The complex is bounded by the access road to the south and the harbor to the north. A security fence encloses the property with access through three gates in the south side fence. The main entrance is through Gate 1, which is staffed 24-hours, seven days a week. Gates 2 and 3 allow oversize truck access to the pier and PPF respectively, and are normally locked. An interior fence separates the PPF area from the rest of the complex, and access to this area is controlled through Gate 4. Two additional emergency access gates, Gate 5 and Gate 6, are located at the northeast and northwest corners of the facility.

Water, sewage, and gas service will be provided to the site by local utility companies. Commercial electrical power will be supplied by Southern California Edison. This power will be distributed through transformers, panel boards, and circuit breakers to all areas within the complex. Emergency power for the PPF will be provided through a 500 kW backup generator with an automatic switching system. To provide further limited protection during test periods, an uninterruptible power supply (UPS) will be available in the processing area.

Industrial waste generated during program procession will be processed in accordance with existing state and federal regulations.

A.4.1 Spacecraft Processing Operations

After delivery to the Home Port, electrical and mechanical checkout of the spacecraft will be conducted in the PPF. After stand-alone testing, the spacecraft will be placed on a customer-provided fueling stand. The customer will be required to perform all required ordnance installation operations prior to fueling. (Please see Appendix B-20 for further details regarding ordnance.) Initial mass properties can be determined at this time. After the customer's fueling team propellant loading operations are complete, final mass properties determinations will be conducted.

While the customer conducts spacecraft ordnance and fueling operations, Sea Launch personnel will transfer the payload fairing and adapter from storage to the PPF encapsulation cell and prepare them for installation. When spacecraft processing is complete, the spacecraft will be transferred to the encapsulation cell and mounted vertically on the flight adapter. The adapter and spacecraft will then be rotated to a horizontal position to accommodate the installation of the payload fairing. Communication checks will be conducted on the spacecraft. Conditioned air flow will be initiated and the payload unit (consisting of the spacecraft, adapter, fairing, and upper stage interface skirt) will be transported to the ACS as a single unit. Spacecraft and equipment environments will be monitored throughout the entire process.

Once onboard the ACS, the payload unit will be mechanically and electrically mated to the previously assembled and tested rocket. Integration tests will be performed between the PU and the rocket. Upon the completion of testing, the ILV will be transferred onto the LP and stowed in the LP hangar. The ACS and the LP will then depart for the launch location.

A.4.2 Payload Processing Facility

The PPF (Figure A.4.2-1) is located in Building 1 on the east side of the Home Port complex (Figure A.4-1). In support of the trend in the industry towards "ship and shoot" spacecraft processing operations, this facility will provide common cells for the conduct of both non-hazardous and hazardous spacecraft operations. All spacecraft processing, propellant transfer operations, pressurization, ordnance preparation, and payload fairing encapsulation operations will be accomplished in the PPF. This area will be separated from the rest of the complex by an interior fence with controlled access through Gate 4 during hazardous spacecraft operations.